

AMERICAN EXTINCT VERTEBRATE ANIMALS.¹

SINCE the foundation of a department of vertebrate palæontology in the American Museum of Natural History in 1891, the curator, Prof. H. F. Osborn, and his assistants have made some most remarkable contributions to our knowledge of the extinct vertebrate animals of North America. The published work of the first six years was collected in one volume at the end of 1897, and the still more numerous papers contained in the museum *Bulletin* during the last six years have just been bound together in a second volume, which is now issued for sale or exchange. Since 1897, five large quarto memoirs on extinct Reptilia and Mammalia have also appeared under the same auspices. All these publications are illustrated both by photographs and by excellent drawings, which not only explain the technical points of the descriptive letterpress, but are also in many cases beautiful works of art.

The pioneer explorations of Leidy, Marsh, and Cope in the arid regions of the west, where the rocks are not obscured by vegetation, revealed more or less in-

plains where there were varying swamps, pools, and wandering streams.

While adopting these careful methods of collecting, the American Museum has recently, with the aid of a generous donation from Mr. William C. Whitney, devoted special attention to the ancestry of the horses. Since 1899 expeditions have been sent out each year into the various Tertiary regions to collect fossil horses, and the result is that the volume now before us contains some of the most important contributions to this test-case of evolution that have hitherto been published. It is curious that although remains of horses were dug up and recognised in America so long

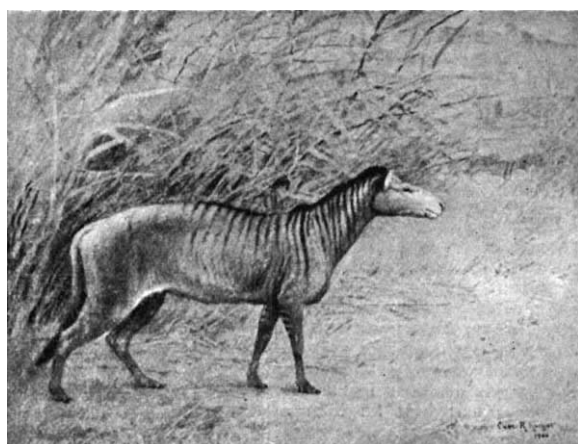


FIG. 1.—Restoration of Four-toed Horse (*Protorhippus*) from the Lower Eocene of Wyoming.

complete evidence of the evolution of several groups of land mammals. Their work is now ably continued by the American Museum in the more favourable circumstances which result from the spread of civilisation and railroads in the remote territories where the fossils occur. Instead of making hurried forays with an armed escort, the explorers are now able to collect at leisure and make detailed observations of the rocks. Photographs are taken of all the important sections and diggings, and notes are made to determine the exact geological position and relative age of all the skeletons collected. The succession of extinct animals in western North America is thus being gradually determined with certainty, and rests less on inference than formerly. The fossiliferous deposits themselves are also better understood, and some of the earlier conclusions as to their origin have been considerably modified by these later researches. For instance, it appears from Dr. W. D. Matthew's work in connection with the American Museum that many of the famous bone-beds in the west are not contained in the sediments of old lakes of immense extent, but are largely wind-borne, and have accumulated on

¹ "Fossil Vertebrates in the American Museum of Natural History Department of Vertebrate Palæontology." Vol. ii. Articles collected from the American Museum *Bulletins* of the years 1898-1903. With a preface by Henry Fairfield Osborn, Curator.

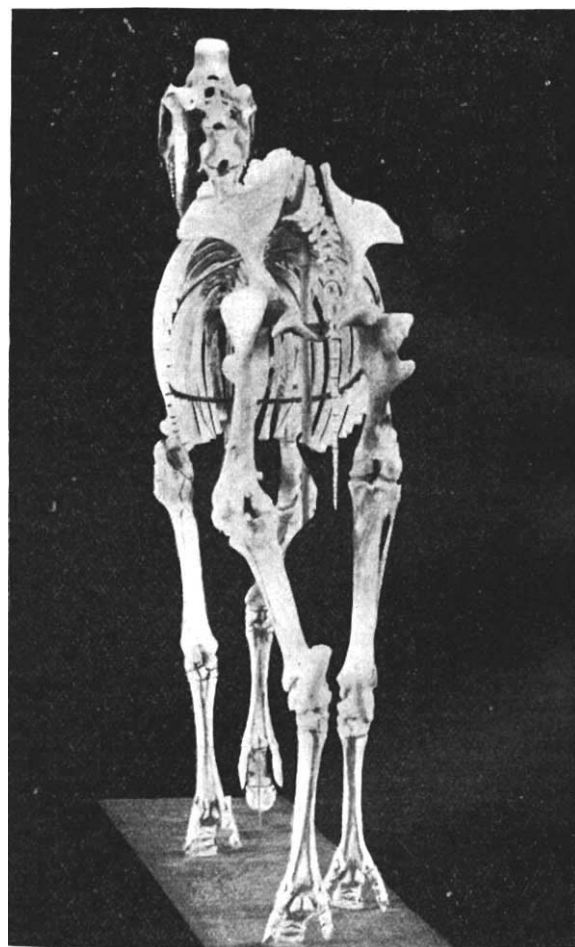


FIG. 2.—Rear view of Skeleton of Three-toed Horse (*Hypohippus*) from the Middle Miocene of Colorado.

ago as 1826, no complete fossil skeleton had been found until Mr. J. W. Gidley quite lately discovered that of the *Equus scotti* in the Lower Pleistocene of Texas. His collection now in the American Museum comprises satisfactory remains of many individuals, and makes it possible for the first time to realise the exact nature of the true horses which were once so abundant on the North American continent, and strangely became extinct before the dawn of history. A complete skeleton of a three-toed horse (*Neohipparion whitneyi*) is also described by Mr. Gidley from the Upper Miocene of South Dakota, and another nearly similar complete skeleton (Fig. 2) was discovered by Mr. Barnum Brown in 1901 in the Middle Miocene of Colorado. These remarkable fossils are mounted in the American

Museum with the older ancestral skeletons and feet obtained from the Cope collection and other sources, and the whole series is described in a popular manner by Dr. W. D. Matthew in an admirable small hand-book which can be purchased by the visitor. The interest of the general public in the "dry bones" is also roused by some attempted "restorations" of the various animals as they appeared when alive, Prof. Osborn having secured the services of a skilful artist, Mr. Charles R. Knight. As an example of this popularisation, we reproduce the life-like drawing of the ancestral four-toed horse, *Protorohippus* (Fig. 1).

Prof. Cope's well known researches on the ancestry of the camels and llamas, which were originally North American animals, have been extended by Dr. Wortman, and he devotes one of the most important papers in the volume now before us to this subject. He and Dr. Matthew also treat of the ancestry of the dogs, while Prof. Osborn himself not only deals with the evolution of the rhinoceroses, but likewise with that of the Amblypoda—the small-brained herbivores of the Eocene period which eventually became bulky and developed fantastic horns when on the verge of extinction. It is curious that the extinct rhinoceroses of North America never developed a horn, except, perhaps, an incipient trace in one species. It is also remarkable that in some of the earliest normal and hornless Amblypoda (*Coryphodon*) Prof. Osborn is able to discover slight indications of a bony thickening where the horn-cores were destined to grow in the later members of the race.

Numerous primitive small-brained carnivores (Creodonts) are described and discussed by Drs. Wortman and Matthew, and a new classification by the latter author advances far beyond any scheme previously published. These animals are very important, because they are not only to be regarded as the ancestors of the higher Carnivora, but are also closely related to the marsupials of the Australian region and South America. The North American specimens appear to be abundant, and many are especially well preserved. Collections like those made by the American Museum are thus of more scientific value than the fragmentary remains with which palæontologists have hitherto been obliged to remain content in the Old World.

Among the remains of true Carnivora discovered by the American Museum expeditions, one of the most interesting is a gigantic skull, 18 inches in length, found with a few other bones of the skeleton in the Upper Miocene of Texas. This specimen evidently belongs to a massive animal which is neither a bear nor a dog, but something intermediate between the two. Dr. Matthew compares it with *Dinocyon* from the Upper Miocene of France, and describes various fragments of allied genera. It now appears that the late Prof. Cope was referring to a jaw of one of these animals when he made the announcement some years ago of the discovery of a fossil hyæna in North America. There is still no evidence of hyænas in the New World.

The ancient American lemurs form the subject of an elaborate technical paper by Prof. Osborn. The possible earliest ancestors of the rodents, from the basal Eocene, are also discussed by him. A horned

rodent—the first known horned member of its order—is described by Dr. Matthew from the Upper Miocene of Colorado. This animal (*Ceratogaulus rhinocerus*) seems to have been related to the beaver, and bears a pair of bony horn-cores on the nose. There is also a paper by Dr. Matthew on the first remains of a true hedgehog discovered in North America.

The perfection of the modern methods of collecting and preparing fossils is well seen in the wonderful carapace of an extinct armadillo, *Glyptotherium texanum*, from the Lower Pleistocene of Texas. It has been known for many years that the typical South American Glyptodonts ranged northwards over the Isthmus of Panama into the southern United States before their final extinction, but no example so nearly complete as that now mounted in the American Museum (Fig. 3) had previously been obtained.

Besides Mammalia, the American Museum has collected many Reptilia, notably Dinosauria from the Jurassic of Wyoming. Since 1898 a party has been sent each year to the so-called Bone Cabin Quarry, which has proved especially rich in megalosaurian and dinosaurian remains. During the first season alone, no less than six nearly complete limbs and three forefeet were disintombed from this spot. Since then a

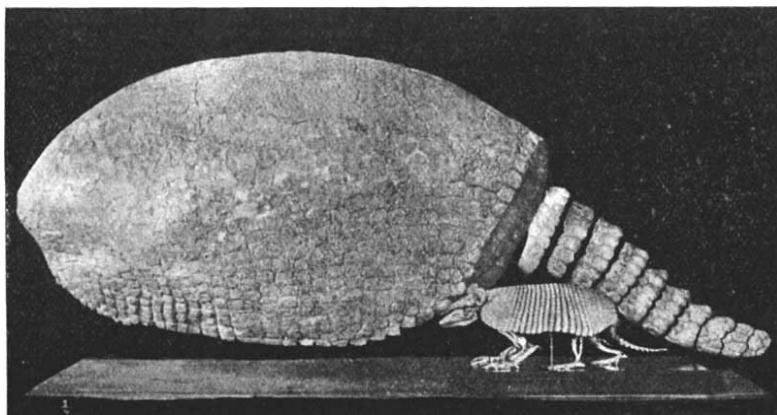


FIG. 3.—Carapace and Tail-sheath of *Glyptotherium texanum* from the Lower Pleistocene of Texas; with a modern Armadillo for comparison.

nearly complete skull of the megalosaurian *Creosaurus*, and the greater part of a skeleton of a new small and slender Dinosaur (*Ornitholestes hermanni*) have been obtained, besides less important fossils. All these are described by Prof. Osborn, and add valuable facts to our knowledge of the animals to which they belong. A well preserved skull of the horned Cretaceous Dinosaur *Triceratops serratus* is also described in much greater detail than heretofore by Prof. R. S. Lull.

It only remains to add that the lower vertebrates are by no means neglected by the American Museum. In the present volume there are two valuable papers on Cretaceous fishes by Dr. O. P. Hay, the one dealing with American specimens in the Cope collection, the other with well preserved fishes from the fissile chalk of the Lebanon, Syria. The latter is particularly interesting as making known much new evidence of the forerunners of the saw-fishes and eels, which were almost completely developed in the Cretaceous period.

In conclusion, it must be remembered that the American Museum of Natural History is only in part a public institution. It receives only limited support from the municipality of New York and the State Board of Education. The department of vertebrate

palæontology depends almost entirely upon private munificence for the means of research. The staff is thus to be congratulated all the more on its remarkable achievements in advancing this branch of science. The collection it has mounted for public exhibition is unique as an illustration of the facts of organic evolution, and the specimens themselves have never been surpassed as examples of skilled collecting and preparation.

A. S. W.

MANCHURIA UNDER RUSSIAN RULE.¹

THIS book, dedicated to the "Gallant Japanese Nation," is a reprint of letters from Manchuria written during the autumn of 1903 for some Far Eastern publications. The narrative of events is brought down to the outbreak of war between Russia and Japan, and a "prologue" has been added to serve as a sketch of the history of Manchuria from the earliest times of which there is any record to the

the world ten years ago. He was astonished at the success which had "attended the spread of Anglo-Saxon trade and ideas under the ægis of England's undisputed naval might," and he thought the time had come for Russia to establish an empire in the Far East. To carry out such a gigantic undertaking it was necessary to secure the services and collaboration of men of genius and untiring industry. Such a man was found in Count Cassini, the Russian Minister at Peking, whose name is associated with that of Prince Uktomsky in this vast project. "These two men," says our author, "did more than any others to set the snowball rolling down from bitter Siberia on to China."

The next step was to organise the Russo-Chinese Bank, for without this Russia could not have gained even a temporary success. M. Pokotiloff, the agent of this bank, and Mr. Victor von Grot, one of Sir Richard Hart's most valued colleagues, were entrusted with the measures necessary to ensure the credit of the Russian Government. Success at first crowned the labours of these men, and the possibilities of the future grew more and more attractive, the ultimate destruction of China and the reduction of Japan to the rank of a secondary Power being not the least important. The first blow to Russian supremacy occurred in 1895, when Japan defeated China and obtained the cession of Liau-tung. This, however, was neutralised by skilful diplomacy, and China retained possession of the forfeited territory at the price of the concession for building the trans-Manchurian Railway. By 1900 the Russo-Chinese Bank had attained the high-water mark of prosperity. But even then there were symptoms of something not being quite right, and when the following year the Russian railway administration decreed that henceforth passenger fares and freight charges must be paid for in rouble notes the whole edifice of Russian Empire in Manchuria began to totter. The



FIG. 1.—The Entrance to Port Arthur. From "Manchu and Muscovite."

present day. The author is well versed in his subject, has travelled extensively in all three provinces of Manchuria, is a careful observer, and shows a sound judgment. His style is easy, and the book well worth reading from beginning to end. Indeed, we may say that it should be read by everyone who wishes to form a true opinion of the remarkable events now taking place in the Far East. For remote as Manchuria is from western Europe, its occupation by Russia, coupled with the lease from China of the peninsula of Kwan-tung, the construction of the "Chinese Eastern Railway," and the war are of great importance to the whole civilised world.

The story of this extraordinary leap in the dark of a great Power whose policy had been hitherto not wanting in prudence and foresight is well told by the author in his opening chapters. The idea, it seems, first occurred to Prince Uktomsky while accompanying the present Tsar, then Tsarevitch, in a tour round

defeat of the "travelling rouble" is well told by Mr. Weale—how the dollar-loving Chinaman resented the threatened loss of what he considered his birthright by the arbitrary decrees of the Russian bureaucrats, how he prepared for battle, and how finally the rouble notes, tons of which had been imported into China, were discredited and disappeared.

The three chief instruments of Russia in her policy of expansion in Manchuria were the rouble, the Russo-Chinese Bank, and the railway. These three were so intimately associated and so well planned to work together that you cannot explain one without mentioning the others. In the words of our author, "they are a three-headed Medusa that turn their threatening faces on poor China and either enchant or quell her with their looks." It was becoming evident that the task Russia had so lightly undertaken was beyond her powers. She had misjudged the resistance she would encounter from the yellow race; great as her own resources were, she had over-rated these. Too confident of her strength, and relying on her successes

¹ "Manchu and Muscovite." By B. L. Putnam Weale. Pp. xx+552. (London: Macmillan and Co., Ltd., 1904.) Price 10s. net.